

### REMARKS

Claims 1-20 remain in the application with claims 17-20 being withdrawn from consideration. Claims 1-16 are in original form with claims 1 and 5 in independent form. No claims have been amended in the present Response.

Claims 1-3 and 5-10 stand rejected under § 103(a) as being unpatentable over Van Steenkiste et al. (United States Patent No. 6,139,913) or Popoola et al. (United States Patent No. 6,464,933) in view of Roberts et al. (United States Patent No. 3,645,298). Claims 1-3 and 5-10 also stand rejected under § 103(a) as being unpatentable over Van Steenkiste et al. or Popoola et al. Claim 4 stands rejected under § 103(a) as being unpatentable over Van Steenkiste et al. or Popoola et al. in view of Roberts et al. as applied to claims 1-3 and 5-10 above, and further in view of Mochida (United States Patent 4,740,408). Finally, claims 11-16 stand rejected under § 103(a) as being unpatentable over Van Steenkiste et al. or Popoola et al. in view of Roberts et al. as applied to claims 1-3 and 5-10 above, and further in view of Belashchenko et al. (United States Patent No. 5,932,293).

The Applicants respectfully traverse these § 103(a) rejections. More specifically, the Applicants respectfully submit that the Examiner has not appropriately established the requisite *prima facie* case of obviousness.<sup>1</sup>

As the Examiner is aware, to establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the reference itself or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. MPEP 2143. The teaching or suggestion to make the claim combination and the reasonable expectation of success must

---

<sup>1</sup> The legal concept of *prima facie* obviousness allocates who has the burden of going forward with production of evidence. The examiner bears the initial burden of factually supporting any *prima facie* conclusion of obviousness. If the examiner does not produce a *prima facie* case, the applicant is under no obligation to submit evidence of nonobviousness. MPEP 2142

both be found in the prior art and not based on applicant's disclosure.<sup>2</sup> *All three of these criteria must be satisfied.*

The Applicants respectfully assert that the Examiner has failed to satisfy the first criterion, i.e., establishing that there is some suggestion or motivation to combine the references above (especially Van Steenkiste et al. or Popoola et al. in view of Roberts et al.), required to establish the *prima facie* case of obviousness. Furthermore, the Applicants assert that the Examiner has also failed to satisfy the third criterion, i.e., establishing that the combination of Van Steenkiste et al. or Popoola et al. with Roberts et al. teaches or suggests all the claim limitations. As indicated above, this third criterion is also required to establish the *prima facie* case of obviousness.

In one form or another, both independent claims 1 and 5 focus on a collimator having a central hole surrounded by a plurality of gas flow holes and a length of from 10 to 30 millimeters with the gas flow holes having a hydraulic diameter of from 0.5 to 5.0 millimeters.

Under the first criteria of the *prima facie* case of obviousness, the case of *In re Sang Su Lee*<sup>3</sup> and *Princeton Biochemicals, Inc. v. Beckman Coulter, Inc.*<sup>4</sup> clarify the law and the Examiner's responsibilities relative to the first criterion.

*In re Sang Su Lee*

*In re Sang Su Lee* clearly defines how suggestion and motivation to modify a reference or to combine reference teachings are determined, and how the knowledge generally available to one skilled in the art is found. The CAFC, in *In re Sang Su Lee*, reviewed a decision from the Board of Patent Appeals and Interferences of the United States Patent and Trademark Office. The Examiner and the Board agreed that Sang Su Lee's invention "would have been obvious to one of ordinary skill in the art since the demonstration mode is just a programmable feature which can be used in many different device[s] for providing automatic introduction by adding the proper programming software," and that "another motivation

---

<sup>2</sup> *In re Vaeck*, 947 F.2d 488, 20 U.S.P.Q. 2d 1438 (Fed. Cir. 1991).

<sup>3</sup> 277 F.3d 1338 (Fed. Cir. 2002).

<sup>4</sup> 411 F.3d 1332 (Fed. Cir. 2005).

would be that the automatic demonstration mode is user friendly and it functions as a tutorial." *Id.* at 1341. However, in this case, the CAFC made it abundantly clear that the Board's and the Examiner's conclusory statements did not adequately address the issue of motivation to modify a reference or motivation to combine references. The factual question of motivation is material to patentability, and could not be resolved on subjective belief and unknown authority. *Id.* at 1343. It is improper, in determining whether a person of ordinary skill would have been led to this combination of references, simply to "[use] that which the inventor taught against its teacher." *W.L. Gore v. Garlock, Inc.*, 721 F.2d 1540, 1553, 220 U.S.P.Q. 330, 312-13 (Fed. Cir. 1983). The court in *In re Sang Su Lee* went on to state that the "common knowledge and common sense" on which the Board relied in rejecting Lee's application are not the specialized knowledge and expertise contemplated by the Administrative Procedure Act. Conclusory statements such as those here provided do not fulfill the agency's obligation. *In re Sang Su Lee*, 277 F.3d at 1342.

*Princeton Biochemicals, Inc. v. Beckman*

The more applicable and recent case, *Princeton*, is discussed immediately below. In June of 2005, the Court of Appeal for the Federal Circuit (CAFC) reiterated the principles involved in assessing the differences between the prior art and the claimed invention when addressing the first criterion...in the subject application, the motivation to combine Van Steenkiste et al. or Popoola et al. and Roberts et al. See *Princeton*. In *Princeton*, citing *Ruiz v. A.B. Chance Co.*, 357 F.3d 1270, 1275 (Fed. Cir. 2004), the CAFC emphasized that a rejection under 35 U.S.C. § 103 specifically requires consideration of the claimed invention "as a whole." Relating to this "as a whole" issue, the CAFC went further to emphasize that

[i]nventions typically are new combinations of existing principles or features. *Envtl. Designs, Ltd. v. Union Oil Co.*, 713 F.2d 693, 698 (Fed. Cir. 1983) (noting that "virtually all [inventions] are combinations of old elements"). The "as a whole" instruction in title 35 prevents evaluation of the invention part by part. *Ruiz*, 357 F.3d at 1275. Without this important requirement, an obviousness assessment might successfully break an invention into its component parts, then find a prior art reference corresponding to each components. *Id.* This line of reasoning would import hindsight into the obviousness determination by using the invention as a roadmap to find its prior art components. Further, this improper method would

discount the value of combining various existing features or principles in a new way to achieve a new result – often the essence of the invention. *Id.*

Contrary to this reasoning, section 103 requires assessment of the invention as a whole. *Id.* This “as a whole” assessment of the invention requires a showing that an artisan of ordinary skill in the art at the time of the invention, confronted by the same problems as the invention and with no knowledge of the claimed invention, would have selected the various elements from the prior art and combined them in the claimed manner. *Id.* In other words, section 103 requires some suggestion or motivation, before the invention itself, to make the new combination. (emphasis added).

In summary of *In re Sang Su Lee* and *Princeton*, the teaching or suggestion to make the combination must be found in the prior art. As such, the teaching or suggestion to combine reference teachings cannot be based on the Applicant’s own disclosure. Finally, the Examiner must explain the reasons why one of ordinary skill in the art would have been motivated to combine them to render the claimed invention obvious.

**Van Steenkiste et al. or Popoola et al. in combination with Roberts et al. (Paragraph 2 of the Office Action):**

In relation to the pending claims, the Examiner correctly recognizes that both Van Steenkiste et al. and Popoola et al. do not disclose, teach, or otherwise suggest a collimator having a length of from 10 to 30 millimeters and also gas flow holes having a hydraulic diameter of from 0.5 to 5.0 millimeters. Then, to supplement this deficiency associated with both Van Steenkiste et al. and Popoola et al., the Examiner relies, in error, on Roberts et al. Simply stated, there is no suggestion or motivation to combine Van Steenkiste et al. or Popoola et al. with Roberts et al.

There is nothing disclosed or taught in Van Steenkiste et al. indicating that it is possible or even desirable to modify the length of its ‘flow straightener’ 40 and there is nothing disclosed or taught in Popoola et al. indicating that it is possible or even desirable to modify the length of its ‘diaphragm’ 26. More specifically, Van Steenkiste et al., which utilizes a gas collimator of the prior art as discussed in the present invention, merely refers to the gas collimator as flow straightener 40. The Examiner is directed to column 3, lines 35-40 and column 3, lines 50-52. There is no discussion, suggestion, teaching or motivation in Van

Steenkiste et al. for considering its gas collimator 40 let alone its length to be a result effective variable on the deposition efficiency of the kinetic spray system as was discovered by the present inventors. Similarly, Popoola et al. is similarly silent as to any effect of its diaphragm 26 on the deposition efficiency of a kinetic spray system.

As for Roberts et al., this reference does not disclose, teach, or even suggest combination of its collimated flow control device, or even its selected length, with a kinetic spray nozzle. Although the Examiner generally references column 1, lines 22+ of Roberts et al., the Examiner provides no convincing evidence why it is in the prior art to combine the collimator of Roberts et al. with a kinetic spray nozzle. Given that there is no discussion in Van Steenkiste et al. and in Popoola et al. of the gas collimators utilized and there is no discussion in Roberts et al. of kinetic spray systems, it is unclear how the Examiner can imagine that the present invention which has been shown to provide a significant enhancement in the deposition efficiency of a kinetic spray system would be obvious based on the references alone or in combination.

Granted, one must also consider knowledge that is generally available to one of ordinary skill in the art when determining whether it is appropriate to combine the teachings of two different references. However, as discussed at length above, when doing so, i.e., when considering the knowledge that is generally available to one of ordinary skill in the art, the teaching or suggestion to make the claimed combination must both be found in the prior art, i.e., in the knowledge of those skilled in the art, and not based on the Applicant's disclosure. Once again, obviousness may not be established by hindsight. *Kahn v. General Motors Corp.*, 45 USPQ2d 1608 (Fed. Cir. 1998). Determination of obviousness cannot be based on the hindsight combination of components selectively culled from the prior art to fit the parameters of the invention. *In re ATD Corp v. Lydal, Inc.*, 48 USPQ2d 1321, 1329 (Fed. Cir. 1998).

To rely on the combination invention claimed in the subject application and then sift through the prior art looking for the invention claimed in the subject application is

impermissible hindsight as discussed above and the Examiner cannot engage in such conduct.<sup>5</sup>

For the Examiner to reach a proper determination under 35 U.S.C. § 103:

The examiner must step backward in time and into the shoes worn by the hypothetical "person of ordinary skill in the art" when the invention was unknown and just before it was made. In view of all factual information, the examiner must then make a determination whether the claimed invention "as a whole" would have been obvious at that time to that person. Knowledge of applicant's disclosure must be put aside in reaching this determination, yet kept in mind in order to determine the "differences," conduct the search and evaluate the "subject matter as a whole" of the invention. The tendency to resort to "hindsight" based upon applicant's disclosure is often difficult to avoid due to the very nature of the examination process. However, impermissible hindsight must be avoided and the legal conclusion must be reached on the basis of the facts gleaned from the prior art.

Importantly, the Applicants are arguing that it is the claimed combination of the particular length of the collimator and the particular hydraulic diameter of the gas flow holes that is nonobvious and, therefore, patentable. In view of the above information outlining the claimed combination and also the Examiner's responsibilities relative to making combinations of prior art, it is apparent that there is no suggestion or motivation in the prior art to combine the references as the Examiner is combining them, specifically Van Steenkiste et al. or Popoola et al. with Roberts et al.

As indicated above, the Applicants assert that the Examiner has also failed to satisfy that the combination of Van Steenkiste et al. or Popoola et al. with Roberts et al. teaches or suggests all the claim limitations. It is established that neither Van Steenkiste et al. or Popoola et al. disclose, teach, or suggest the diameter of the gas flow holes as particularly claimed. Relative to Roberts et al., the Examiner contends that this reference discloses a collimator having flow holes with a hydraulic diameter of 0.5 mm. This is not the case. In

---

<sup>5</sup> The courts have also indicated that it is impermissible to use the inventor's disclosure as a road map for *selecting* and combining prior art disclosures.

Roberts et al., every occurrence of the cross section dimension of its flow passages is under approximately 500 microns (which equals 0.5 mm). If Roberts et al. clearly indicates that this diameter is under 0.5 mm, then how can Roberts et al. possibly disclose the 0.5 to 5.0 mm as claimed in independent claims 1 and 5? The third criteria (teaching or suggestion of all claim limitations) is, therefore, not satisfied and the requisite *prima facie* case is not established.

**Modification of Van Steenkiste et al. or Popoola et al. (Paragraph 3 of the Office Action):**

In making this particular rejection, where the Examiner seems to simply modify (without combining) Van Steenkiste et al. or Popoola et al, the Examiner concludes in an overly conclusory fashion that "it would have been an obvious matter of design choice to a person of ordinary skill in the art to configure the device of Van Steenkiste et al. or Popoola et al. with gas flow holes" of a certain length. The Examiner, in his own statements, indicates that the reason this would have been an obvious matter of design choice is "because [the] Applicant has not disclosed that to have the gas flow holes of 10-25 millimeters length....provides an advantage, is used for a particular purpose, or solves a stated problem." This is not an appropriate standard for an Examiner to modify a single reference and base a § 103(a) rejection on. That is, an Examiner cannot conclude that an invention as claimed is obvious because an Applicant has not *disclosed* that a certain claimed feature provides an advantage, is used for a particular purpose, or solves a stated problem.

Instead, as already outlined above, the law and MPEP clearly require that for an Examiner to appropriately modify a single reference, there must be some suggestion or motivation *in the prior art references themselves or in the knowledge generally available to one of ordinary skill in the art*. The Examiner cannot use as a basis for making a § 103(a) rejection what an Applicant does not disclose.

Aside from this error in the Examiner's analysis, in the original specification (see Paragraphs [0002]-[0006]) and also in the prior response dated November 10, 2005, the Applicant already outlined that the deficiencies in the prior art kinetic spray systems and

already explained that the length of the collimator as claimed herein provides an advantage, is used for a particular purpose, or solves a stated problem.

To reiterate, Paragraph [0025] of the present specification describes that in the prior art kinetic spray systems the collimator 40 is a disc having a thickness of approximately 1 mm. It is also noted in paragraph [0030] that a similar gas collimator has been utilized in the past in low pressure kinetic spray systems. In contrast, the gas collimator of the present invention is disclosed in paragraph [0030] and figures 4, 5, and 8b of the present specification. As noted, the present invention lies in significantly lengthening the gas collimator to a length of from 10-30 mm and more preferably from 25-30 mm, a 10-30 fold increase over the length disclosed in the prior art.

The Examiner is now directed to paragraphs [0003] through [0005] of the present specification wherein it discloses the numerous problems with the prior art systems incorporating gas collimators that are very thin 1 mm discs. The problems are low deposition efficiencies that cannot be alleviated by raising the main gas temperature without leading to clogging issues, asymmetric assimilation of particles into the gas stream, turbulence within the gas stream which reduces the deposition efficiency of the system. All of these problems are addressed by the present invention. As for the advantages of the present invention the Examiner is directed to figure 7, figure 9a, and figure 9b. In addition, the Examiner is directed to paragraphs [0035] through [0038] wherein these figures are discussed. A careful review of the data disclosed in these figures makes it clear that the present invention provides significant advantages over the prior art gas collimator that are related to the specifics that are claimed in independent claims 1 and 5.

Referring to figure 7 and paragraph [0035], the results disclosed in figure 7 were obtained using a constant main gas temperature of 800°F, particles of aluminum-zinc-silicon having a particle size range of from 53-106 microns, a constant traverse speed of 2 inches per second, and a constant main gas pressure of 300 pounds per square inch. Reference line 100 in figure 7 shows the results utilizing a prior art high pressure system wherein the collimator is a thin disc of approximately 1 mm in thickness. As expected the



results show that as the powder feed rate of the system is increased the loading onto a substrate surface is increased. An example of the nozzle utilized for generating these results is shown in figure 2. Reference line 104 shows the results that are obtained using a prior art low pressure system as disclosed in figure 3. This is a low pressure system and as expected the mass loading obtained utilizing the prior art low pressure system at a given feed rate is lower than that of the prior art high pressure system as one would expect. In both cases the amount of loading increases as the powder feed rate is increased as expected.

What was unexpected is what is disclosed in reference line 102. This represents a gas collimator designed in accordance with the present invention in a low pressure system wherein the collimator has a length of from 10-30 mm, the collimator utilized in this figure had a length of approximately 25 mm, and the gas flow holes had a hydraulic diameter of from 0.5 to 5 mm. It can be seen that at all powder feed rates the present invention gas collimator provided a significant increase in the mass loading onto a substrate obtainable by a given powder feed rate. The Examiner can see by a comparison between reference lines 104 and 102 that the present invention provides a significant and unexpected advantage. As expected and discussed in the specification even with this enhanced deposition efficiency reference line 102 is not as high as reference line 100.

The Examiner is now directed to figures 9a and 9b and paragraphs [0036] through [0038]. All of the data disclosed in both figures was generated utilizing a powder that was an alloy of aluminum-zinc-silicon, sprayed onto aluminum substrate, the powder feed rates were kept constant, the particle size range was from 53 to 106 microns, the gas pressure was 300 pounds per square inch, the powder feed pressure was 350 pounds per square inch and the results disclosed in the figures are the average of twelve runs for each condition. The systems were high pressure systems.

Figure 9a shows the loading onto a substrate of two examples of the present invention versus a prior art system. Bar 118 represents the results obtained utilizing a gas collimator designed in accordance with the present invention wherein the length was approximately 20 mm and the gas flow holes had a hydraulic diameter of from 0.5 to 5 mm. The results were

obtained using a main gas temperature of 700°F and a traverse speed of 4 inches per second. It can be seen that the results are close to 140 grams per square meter of loading utilizing these conditions. This is in comparison to reference bar 122 which represents the prior art system wherein the gas collimator as disclosed has a thickness of approximately 1 mm. The results shown in bar 122 were obtained after raising the main gas temperature to 800°F and lowering the traverse speed to 3 inches per second. Based on knowledge of the prior art it would be expected that increasing the main gas temperature and reducing the traverse speed should lead to a higher loading of the substrate. Surprisingly, the results are completely unexpected in that the loading was significantly reduced compared to bar 118 utilizing the gas collimator of the present invention. In addition, even when the traverse speed is increased from 4 inches per second to 5 inches per second as shown in bar 120 the present invention still results in a significant increase in the loading on the substrate compared to the prior art shown in bar 122.

Examiner is now directed to figure 9b which shows the deposition efficiency of the present invention versus the prior art. Bar 124 is the deposition efficiency of a system identical to that disclosed in bar 118 above, namely a main gas temperature of 700°F and a traverse speed of 4 inches per second. You can see that the deposition efficiency is close to 50% under these conditions. Bar 126 represents a system identical to that disclosed in bar 120 in figure 9a. In the system the main gas temperature was 700°F and the traverse speed was 5 inches per second. Finally, it can be seen that the deposition efficiency of the prior art system shown in bar 128 is less than half that disclosed in either of the prior present invention systems even though the main gas temperature has been increased to 800°F and the traverse speed has been reduced to 4 inches per second.

In summary, the data disclosed and discussed in the present specification makes it clear that the gas collimator designed in accordance with the present invention produces unexpected and significant advantages compared to that found in the prior art. It solves a significant problem in that it enables an operator to utilize a lower main gas temperature while getting a highly enhanced deposition efficiency even at higher traverse speeds. The

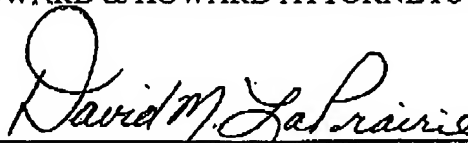
significance of the advantage provided by the gas collimator of the present invention cannot be over emphasized.

In view of the remarks set forth above, it is respectfully submitted that no *prima facie* case of obviousness can reasonably be established by the Examiner. As such, it is respectfully submitted that the Examiner's § 103(a) rejections relying on Van Steenkiste et al. or Popoola et al., either alone or in combination with Roberts et al., are improper and should be withdrawn. The remaining § 103(a) rejections which additionally incorporate Mochida et al. and Belashchenko et al. in one form or another are also improper because they initially rely on the same inappropriate combination of Van Steenkiste et al. or Popoola et al. with Roberts et al.

Independent claims 1 and 5 are in condition for allowance and the remaining claims depend either directly or indirectly from the non-obvious features of claims 1 and 5 such that the dependent claims are also allowable.

The Commissioner is authorized to charge Deposit Account No. 08-2789 for any additional fees or credit the account for any overpayment.

HOWARD & HOWARD ATTORNEYS PC



David M. LaPrairie, Reg. No. 46,295  
HOWARD & HOWARD ATTORNEYS PC  
39400 WOODWARD AVE., STE. 101  
BLOOMFIELD HILLS, MI 48304  
(248) 723-0442

April 24, 2006  
Date